

What is claimed is:

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1 1. A method of determining inventory levels of parts for a
2 plurality of stocking locations, said method comprising the steps
3 of:

4 providing data for a plurality of customer locations, unit price - *observed*
5 of said parts, ^{*demand*} request rates for each of said parts for each of
6 said customer locations, handling costs for each of said stocking *observed*
7 locations, and travel time and transportation cost between said *transportation*
8 stocking locations;

9 specifying a parts procurement time performance measure; *lead time*

10 entering said data and said performance measure into an
11 optimization computer program;

12 computing said inventory levels of said parts for said plurality
13 of stocking locations using said optimization computer program;
14 and

15 ordering sufficient numbers of said parts to maintain said
16 inventory levels at said plurality of stocking locations.

1 2. The method of claim 1, wherein said data for a plurality of
2 customer locations includes travel time and cost to transfer a
3 part from each of said plurality of stocking locations to each of
4 said customer locations.

1 3. The method of claim 1, wherein said request rates includes a
2 probability distribution for one or more of said request rates.

1 4. The method of claim 3, wherein said probability distribution
2 is a Poisson distribution.

1 5. The method of claim 1, wherein said part procurement time
2 performance measure comprises the percentage of parts in said
3 request rates which can be transferred from any said stocking
4 location to each said respective customer location within a
5 pre-specified time.

1 6. The method of claim 5, wherein said parts are grouped by
2 importance into a plurality of groups and said pre-specified time
3 comprises a corresponding plurality of times.

1 7. The method of claim 6, wherein inventory levels are computed
2 to minimize overall cost while meeting or exceeding said
3 plurality of times.

1 8. The method of claim 1, wherein said optimization computer
2 program is a mixed integer optimization program.

1 9. The method of claim 1, wherein said inventory levels are
2 computed to meet a total inventory cost while maximizing the
3 percentage of said parts in said request rates which can be
4 transferred from any said stocking location to each respective
5 said customer location within said pre-specified time.

1 10. The method of claim 1, further comprising the step of
2 computing the estimated time for each part to be transferred from
3 any said stocking location to each respective said customer
4 location for each of said parts in said request rates.

1 11. A computer implemented method of specifying parts inventory
2 levels for a network of stocking locations, said method
3 comprising the steps of:

4 providing data for a plurality of customer locations, unit price
5 of said parts, request rates for each of said parts for each of
6 said customer locations, handling costs for each of said stocking
7 locations, and travel time and transportation cost between said
8 stocking locations;

9 specifying a parts procurement time performance measure;

10 formulating a mixed integer optimization model of said network;
11 and

12 entering said model on a processor to solve said mixed integer
13 model to obtain said inventory levels for each of said stocking
14 locations in said network.

1 12. The method of claim 11, wherein said model includes a total
2 inventory cost constraint.

1 13. The method of claim 11, wherein said inventory levels are
2 solved to minimize overall cost while meeting or exceeding said
3 parts procurement time performance measure.

1 14. A computer system for controlling inventory levels of parts
2 for a plurality of stocking locations, comprising:

3 a processor;

4 one or more files on said computer system containing data for a
5 plurality of customer locations, unit price of said parts,
6 request rates for each of said parts for each of said customer
7 locations, handling costs for each of said stocking locations,
8 and travel time and transportation cost between said stocking
9 locations;

10 means for computing on said processor a parts procurement time
11 performance measure;

12 an optimization computer program on said processor for
13 calculating said inventory levels of parts for said plurality of
14 stocking locations; and

15 an ordering system on said computer system for maintaining said
16 inventory levels at said plurality of stocking locations.

2
1 15. The system of claim 14, wherein said data for a plurality of
2 customer locations includes travel time and cost to transfer a
3 part from each of said plurality of stocking locations to each of
4 said customer locations.

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1 16. The system of claim 14, wherein said request rates includes a
2 probability distribution for one or more of said request rates.

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1 17. The system of claim 14, further comprising a mixed integer
2 model of said network.

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1 18. The system of claim 17, wherein said model is formulated to
2 minimize overall cost while meeting or exceeding a pre-specified
3 parts procurement time performance measure.

1 19. A computer program product for instructing a processor to
2 determine inventory levels of parts for a plurality of stocking
3 locations, said computer program product comprising;
4 a computer readable medium;
5 first program instruction means for providing data for a
6 plurality of customer locations, unit price of said parts,
7 request rates for each of said parts for each of said customer
8 locations, handling costs for each of said stocking locations,
9 and travel time and transportation cost between said stocking
10 locations;
11 second program instruction means for specifying a parts
12 procurement time performance measure;
13 third program instruction means for entering said data and said
14 performance measure into an optimization computer program;
15 fourth program instruction means for computing said inventory
16 levels of said parts for said plurality of stocking locations
17 using said optimization computer program; and
18 fifth program instruction means for ordering sufficient numbers
19 of said parts to maintain said inventory levels at said plurality
20 of stocking locations; and wherein
21 all said program instruction means are recorded on said medium.